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TWELVE POINTS IN GRADING DRY EDIBLE BEANS

Farmers in the commercial bean areas are being asked to plant more beans as a war crop. To stimulate production, the War Food Administration has supported the market and made storage loans available on thresher-run beans. Support prices and loan values are based on the Federal bean grades. In determining the value of beans, knowledge of the grade is important.

Farmers know they cannot get top prices for beans that are split, damaged, or mixed with trash and dirt. The Federal bean grades are **U. S. No. 1, U. S. No. 2, U. S. No. 3, U. S. Substandard,** and **U. S. Sample.** There are also special grades relating to hand-picked, high-moisture, and off-color beans.

Note.—The standards for limas and baby limas do not include the No. 3 grade, but do include an additional grade, U. S. Extra No. 1.

As they come from the thresher, beans may contain one or more pounds to the hundredweight of cracked or discolored beans, pieces of dirt, and small pebbles. Thresher-run beans often grade U. S. Substandard because of excess foreign material or other defects or because they contain small, shriveled beans. This undesirable material is sometimes called "pick."

WAR FOOD ADMINISTRATION
U. S. DEPARTMENT OF AGRICULTURE

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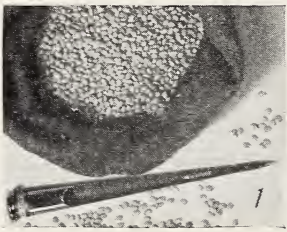
Some farmers sell their beans on the basis of the buyer's analysis before the beans are cleaned and are paid only for the sound beans. Others retain ownership until their beans have been cleaned. Methods of sale vary in different producing areas.

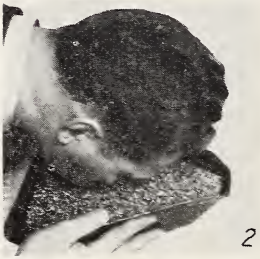
For removing undesirable materials from the beans, cleaning machinery and hand picking are used. After cleaning, the beans are ready for marketing under one of the higher grades. A description of the several points for determining bean grades follows:

1. THE SAMPLE



Start with a fair and average sample of the beans. Use a trier (fig. 1) or a probe to draw it.

2. ODORS AND HEATING



Smell the sample (fig. 2). Beans that smell musty or sour, or of oil or fertilizer, or that have other objectionable odors, are placed in Sample grade, which is the lowest. Beans that are heating also are graded as Sample. Grade losses from bad odors and heating can be avoided if harvesting is done when beans are dry and if they are stored in a dry, well-ventilated place.

3. INSECTS

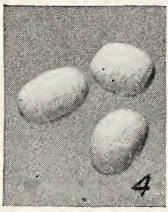
Look the sample over carefully for weevils or other insects and for beans that have been insect damaged. Weevil-infested or weevil-damaged beans are graded as Sample. Grades 2 and 3 of the class Blackeye may, however, contain 0.2 and 0.5 percent, respectively, of weevil-bored beans from which the insects

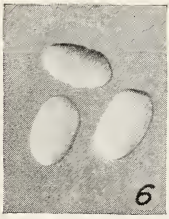
have emerged and left a clean-cut open cavity (fig. 3) free from larvae, webs, refuse, mold, or stain. Insects may cause the beans to heat and also may raise the moisture content.

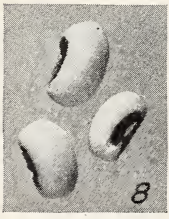
Beans can be protected from weevil injury by fumigation after they have been threshed and are in storage. Especially in areas where weevils are prevalent, beans should be examined about every 30 days for possible reinfestation while in storage.[1]

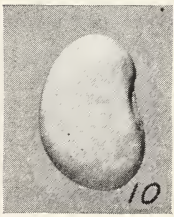
4. CLASS

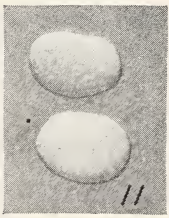
Beans are divided into classes based on their commonly accepted commercial type, name, or variety. The classes most widely grown and marketed in the United States are Pea Beans (fig. 4), Great Northern (fig. 5), Flat Small White (fig. 6), Small White (fig. 7), Blackeye (fig. 8), Yelloweye (fig. 9), Lima (fig. 10), Baby Lima (fig. 11), Cranberry (fig. 12), Pinto (fig. 13), Western Red Kidney (fig. 14), Dark Red Kidney (fig. 15),











Light Red Kidney (fig. 16), Pink (fig. 17), Small Red (fig. 18), and Bayo (fig. 19). There are many

[1] See Weevils in Beans and Peas. U. S. Dept. Agr. Farmers' Bul. 1275. 37 pp., illus. Washington, D. C., August 1922.

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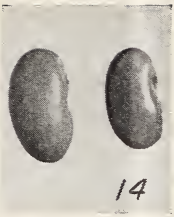
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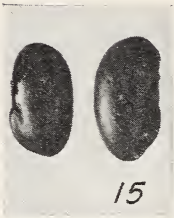
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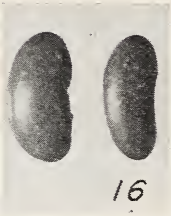
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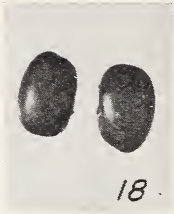
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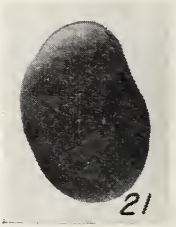
other less-known classes, such as Mung (fig. 20) and Fava (fig. 21), also Marrow, White Kidney, Old-Fashioned Yelloweye, Large White, and Black Turtle Soup.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Allowance of other classes.—Lima and Baby Lima classes may contain not more than 1 percent of beans of contrasting classes and not more than 10 percent of other classes that blend. (See Points 7d and 8, p. 7.) Beans of all other classes, except Mixed beans, may contain not more than 2 percent of beans of contrasting classes and not more than 15 percent of other classes that blend.

Mixed beans.—When the contrasting classes or the classes that blend exceed the limitations

previously stated, the beans are classed as Mixed. Consumers generally object to mixed beans because of their appearance or to the variations in time required to cook the different kinds of beans in the mixture. No price or loan supports have been offered by the War Food Administration for Mixed beans.

Care in harvesting and handling is necessary to avoid mixing beans when those of several different classes are grown and marketed in the same community.

5. GRADE

All classes of beans, except Limas and Baby Limas, are divided into five Federal grades. (See p. 1.) Limas and Baby Limas are graded as **U. S. Extra No. 1, U. S. No. 1, U. S. No. 2, U. S. Substandard,** and **U. S. Sample.**

The number of various defects present determines mainly the different grades in which beans are placed. These defects include splits, beans of contrasting classes, and foreign material. Blistered, wrinkled, skinned, or broken beans also are considered in the grading of Limas and Baby Limas (tables 1 and 3).

6. HAND-PICKED BEANS

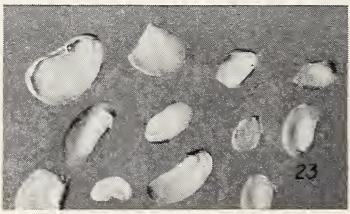
Hand-picked beans are in demand. Canners, for example, are unable to use beans that contain stones or dirt or that are badly damaged or decayed. The practice of selling beans in cellophane packages has increased the demand for the refined product in home, restaurant, and hotel. The U. S. standards, therefore, provide grades for hand-picked beans. The top grade is designated as Choice Handpicked. Other hand-picked beans are graded as U. S. No. 1, Hand-

picked; U. S. No. 2, Handpicked; or U. S. No. 3, Handpicked, depending on the percentage of defects (table 4).

7. DEFECTS

To make an analysis for defects, a representative portion of the sample weighing from 250 to 500 grams, according to the size of the beans, is weighed, and the analysis is made by picking out the defects by hand (fig. 22). All percentages are determined by weight. A mechanical device known as a Boerner sampler or divider is used by bean inspectors to obtain representative portions of the sample.

a. Splits.—Except for Lima and Baby Lima grades for which allowance is definitely stated, the quantity of splits in a grade is limited by the total of all defects. For example, U. S. No. 1 Great Northern beans, if free of other defects, might contain 2 percent of splits, but this allowance would be reduced if other defects such as damaged beans, beans of contrasting classes, or foreign material were present (table 1). Split beans are pieces that are not damaged but consist of three-fourths or less of the whole bean. They include beans the halves of which are held together loosely (fig. 23).



b. Damaged beans.—Beans and pieces of beans that have been injured by frost, weather, disease, insects, or other causes are classed as damaged beans (fig. 24). Damage is an important grade factor because of its effect on qual-

ity and because damaged beans are difficult to remove. As for splits, the percentage of damaged beans may equal the percentage allowed for all defects in the grade if other defects are absent. However, for Lima and Baby Lima grades, special limits are provided for badly damaged beans, and in the special grades for hand-picked beans those damaged are limited to 0.3 percent.

c. Foreign material.—Stones, dirt, weed seeds, cereal grains, and all matter other than beans are considered foreign material (fig. 25).

d. Contrasting classes.—Beans whose color, size, and shape differ from the class under consideration are beans of contrasting classes.

Special limitations are placed for total foreign material including stones and for contrasting classes in all the numerical and the special grades (tables 1 to 4).

8. OTHER CLASSES THAT BLEND

Sound beans of classes that are similar in color, size, and shape, referred to as "other classes that blend," are not so objectionable as those of contrasting types, and a liberal allowance is permitted in the grades for mixtures of these classes. Other classes that blend are not included in total defects (tables 1 to 4).

9. WELL-SCREENED BEANS, ALL CLASSES

Beans that are not well screened cannot grade higher than U. S. Substandard. Determination of grade is based on the general appearance of the sample. The presence of shriveled,

undersized, or immature beans indicates that the beans have not been subjected to ordinary cleaning and screening.

10. OFF-COLOR SPECIAL GRADE AND MATERIALLY WEATHERED BEANS

When the sample after removal of defects is distinctly off-color because of age or other natural cause but is not materially weathered, the term "off-color" is added to the grade, as U. S. No. 1 Pinto Beans, Off-color. When the sample of beans before removal of defects is materially weathered, it is graded as Sample.

11. MOISTURE

Moisture in beans becomes a factor in grading only when it exceeds 18 percent. Fractions of less than one-half percent of moisture are disregarded in certifying moisture in beans. In practical application, the high moisture grade applies when the moisture content is 18.5 percent or more. Then a statement of the moisture present is added to the grade in terms of whole and half percents, as, U. S. No. 1 Pea Beans, Moisture 19.5 percent.

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Bean inspectors use a machine for making a moisture test (fig. 26). This test is made on a portion of the sample from which the foreign material has been removed by sieving. When the Brown-Duvel moisture tester is used, the beans are heated in oil to measure the moisture content. Special conversion charts are used when the moisture content is determined with electric testers.

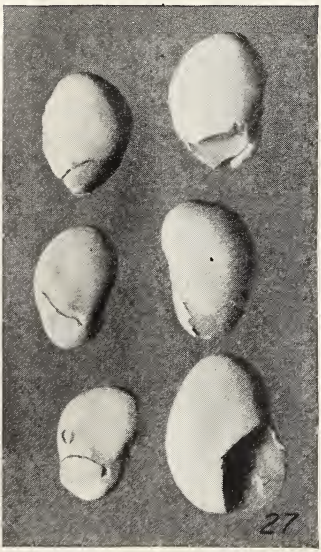
12. SPECIAL FACTORS IN THE LIMAS ONLY

Blistered, wrinkled, skinned, or broken.—Such beans must be sound but may have physical defects—bad blistering, burst or deeply wrinkled

skins. Included are beans badly warped or misshapen, beans having one-eighth or more of the seed coat removed, and broken beans of which more than three-fourths of the whole bean remains (fig. 27). Sound broken beans consisting of three-fourths or less of the whole bean are classed as Splits (fig. 23).

Badly damaged lima beans are also shown (fig. 28).

Size.—In addition to requiring that beans be well screened, the standards provide certain size requirements for lima beans (table 3, footnotes 1 to 3). The test for size is made with three metal sieves having round-hole perforations 30/64, 28/64, and 24/64 of an inch in diameter (fig. 29).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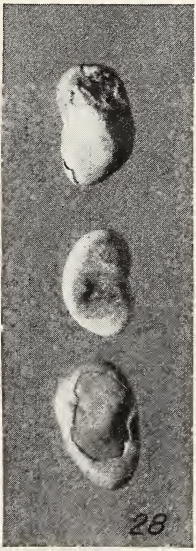
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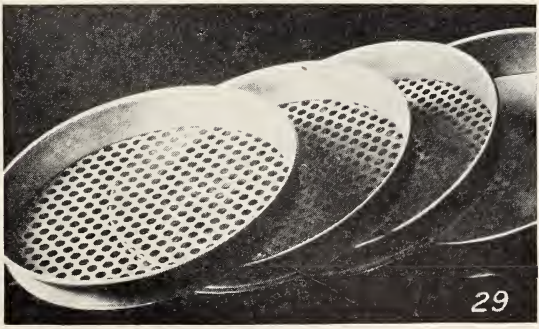
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TABLE 1.—*Grade requirements for all classes of beans except Pinto, Lima, and Baby Lima beans*

GRADE	MAXIMUM LIMITS OF—				
	DEFECTS CONSISTING OF SPLITS, DAMAGED BEANS, CONTRASTING CLASSES, AND FOREIGN MATERIAL				OTHER CLASSES THAT BLEND [2]
	Total Defects [1]	Contrasting Classes	Foreign Material		
			Total	Stones	
	Percent	*Percent*	*Percent*	*Percent*	*Percent*
U. S. No. 1 [3]	2.0	0.5	0.5	0.2	5
U. S. No. 2 [3]	4.0	1.0	1.0	.4	10
U. S. No. 3 [3]	6.0	2.0	1.5	.6	15
U. S. Substandard	U. S. Substandard grade shall include beans of any one of these classes that do not come within the requirements of the specifications for grade U. S. No. 1, U. S. No. 2, or U. S. No. 3, or for U. S. Sample grade.				
U. S. Sample	U. S. Sample grade shall include beans of any one of these classes that are musty or sour, or heating, or hot, or weevily, or materially weathered, or that have any commercially objectionable odor, or that are otherwise of distinctly low quality.				

[1] Of the class Blackeye, the beans in grade U. S. No. 2 may contain not more than 0.2 percent, and the beans in grade U. S. No. 3 may contain not more than 0.5 percent, of clean-cut weevil-bored beans.

[2] Of the classes Yelloweye and Old-Fashioned Yelloweye, the beans may contain 10 percent of white beans, similar to Yelloweye and Old-Fashioned Yelloweye in size and shape, in grade U. S. No. 1; 15 percent in U. S. No. 2; and 15 percent in U. S. No. 3.

[3] The beans in grades U. S. No. 1, U. S. No. 2, and U. S. No. 3 of any one of these classes shall be well screened.

TABLE 2.—*Grade requirements for the class Pinto beans*

GRADE	MAXIMUM LIMITS OF—				
	DEFECTS CONSISTING OF SPLITS, DAMAGED BEANS, CONTRASTING CLASSES, AND FOREIGN MATERIAL				OTHER CLASSES THAT BLEND
	Total	Contrasting Classes	Foreign Material		
			Total	Stones	
	Percent	*Percent*	*Percent*	*Percent*	*Percent*
U. S. No. 1 [1]	4	0.5	0.5	0.2	5
U. S. No. 2 [1]	6	1.0	1.0	.4	10
U. S. No. 3 [1]	8	2.0	1.5	.6	15
U. S. Substandard	U. S. Substandard grade shall include beans of this class that do not come within the requirements of the specifications for grades U. S. No. 1, U. S. No. 2, or U. S. No. 3, or for U. S. Sample grade.				
U. S. Sample	U. S. Sample grade shall include beans of this class that are musty, or sour, or heating, or hot, or weevily, or materially weathered, or that have any commercially objectionable odor, or that are otherwise of distinctly low quality.				

[1] The beans in the grades U. S. No. 1, U. S. No. 2, and U. S. No. 3 of this class shall be well screened.

TABLE 3.—*Grade requirements for the classes Lima and Baby Lima beans*

Grade	Maximum limits of—							
	Blistered, Wrinkled, Skinned, or Broken	Splits	Defects Consisting of Damaged Beans, Contrasting Classes, and Foreign Material					Other Classes That Blend
			Total	Badly Damaged Beans	Contrasting Classes	Foreign Material		
						Total	Stones	
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
U. S. Extra No. 1 [1] [4]	3	2	1	0.5	0.2	0.2	Trace	2
U. S. No. 1 [2] [4]	5	3	2	1.0	.5	.5	0.2	5
U. S. No. 2 [3] [4]	8	4	3	1.5	1.0	1.0	.3	10
U. S. Substandard	U. S. Substandard grade shall include beans of any one of these classes that do not come within the requirements of the specifications for the grades U. S. Extra No. 1, U. S. No. 1, or U. S. No. 2, or for U. S. Sample grade.							
U. S. Sample	U. S. Sample grade shall include beans of any one of these classes that are musty, or sour, or heating, or hot, or weevily, or materially weathered, or that have any commercially objectionable odor, or that are otherwise of distinctly low quality.							

[1] Beans in the grade U. S. Extra No. 1 of the class Lima may contain not more than 20 percent of beans that will pass through a No. 30 sieve, of which 20 percent may include not more than 5 percent of beans that will pass through a No. 28 sieve.

[2] The beans in the grade U. S. No. 1 of the class Lima may contain not more than 25 percent of beans that will pass through a No. 28 sieve, of which 25 percent may include not more than 5 percent of beans that will pass through a No. 24 sieve.

[3] The beans in the grade U. S. No. 2 of the class Lima may contain not more than 40 percent of beans that will pass through a No. 28 sieve, of which 40 percent may include not more than 5 percent of beans that will pass through a No. 24 sieve.

[4] The beans in the grades U. S. Extra No. 1, U. S. No. 1, and U. S. No. 2 of any one of these classes shall be well screened.

TABLE 4.—*Grades for hand-picked beans*

Grade	Maximum limits of—				
	Defects Consisting of Splits, Damaged Beans, Contrasting Classes, and Foreign Material				Other Classes That Blend
	Total Defects	Badly Damaged Beans	Contrasting Classes	Foreign Material	
	Percent	*Percent*	*Percent*	*Percent*	*Percent*
U. S. Choice Hand-picked	1.5	0.3	0.01	0.01	5
U. S. No. 1 Hand-picked	2.0	.3	.01	.01	5
U. S. No. 2 Hand-picked	4.0	.3	.01	.01	10
U. S. No. 3 Hand-picked	6.0	.3	.01	.01	15

NOTE.—The grades for hand-picked beans do not apply to Pintos, Limas, Baby Limas, or Mixed beans or to off-color beans.

OFFICIAL INSPECTION SERVICE

Official inspection for beans is available at shipping points in all producing areas. This service is conducted in cooperation with State departments of agriculture. Qualified State inspectors are licensed by the Secretary of Agriculture to inspect and grade beans and are authorized to issue Federal-State certificates for beans inspected. Such inspectors are supervised by the Office of Distribution, War Food Administration. The service covers lots of beans offered for inspection in warehouses, in railroad cars, or as samples submitted to an inspector by an interested person. Certificates issued for submitted samples, however, cover the sample only. Licensed samplers are located at many points distant from an inspector's headquarters. Samples obtained by these licensed samplers are accepted by inspectors as official, and the certificates issued cover the lots from which the sample is drawn, in the same manner as those issued for lots sampled by the inspector.

If an objection is taken to the grade assigned by an inspector, an appeal from his grading may be filed with the district supervisor of the Grain Products Branch, Office of Distribution of the War Food Administration. These supervisors are located at points within or adjacent to areas of production and marketing. They can give further information on the inspection and grading of beans.

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See your county agricultural agent or write to your State agricultural college for more information about beans.

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